



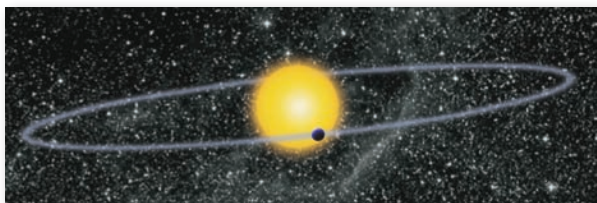
NASA Ames Research Center, Artist's Concept

Kepler Mission: A Search for Habitable Planets

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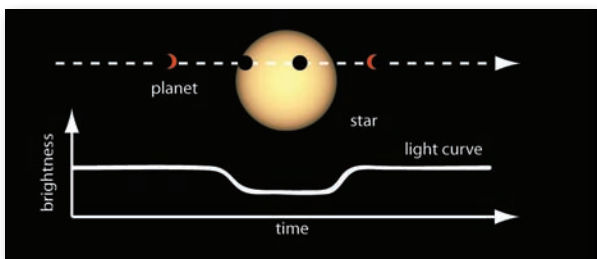
Are There Habitable Planets Beyond Our Solar System?

Is Earth unique in the universe? How many Earth-size planets exist? NASA's *Kepler* team seeks to answer these questions by using the "transit method" for detecting planets. *Kepler* will be able to find planets the size of Earth and even smaller orbiting in the habitable zone of other stars. The habitable zone is the distance from a star where liquid water can exist on the surface of the planet. For the first time in human history, we will know if there are Earth-size planets capable of supporting life beyond our solar system.



What Is The Transit Method?

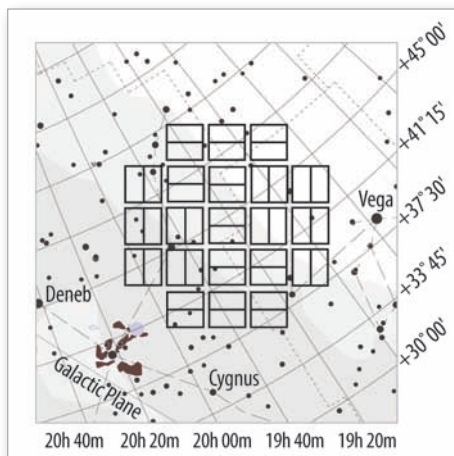
When a planet passes in front of a star as viewed from Earth, the event is called a "transit." On Earth, we can observe an occasional Venus or Mercury transit. These events are seen as a small black dot creeping across the Sun—Venus or Mercury blocks sunlight as the planet moves between the Sun and us. *Kepler* finds planets by looking for tiny dips in the brightness of a star when a planet crosses in front of it—we say the planet transits the star. But the dips in brightness are so small, detecting them is like seeing the dimming of a car's headlight caused by a gnat or grain of sand.



Measurements of the brightness variations of stars are used to detect Earth-size planets.

How Does *Kepler* Do It?

Kepler is a spacecraft with a specialized telescope that performs like a very precise light meter called a photometer. *Kepler* will stare at one area of the sky in the constellation Cygnus, an area larger than a hand held at arm's length (see illustration below).



Kepler Field of View

Kepler will stare continuously at this star field for years—virtually never blinking—making brightness measurements of all 100,000 stars every 30 minutes. By precisely measuring changes in each star's brightness and with some follow-up ground-based observations, the *Kepler* team will be able to determine:

- what types of stars have planets
- sizes of planets
- length of planetary years (orbital periods)
- distance planets are from their host stars
- characteristic temperatures of planets

...and for giant planets like Jupiter

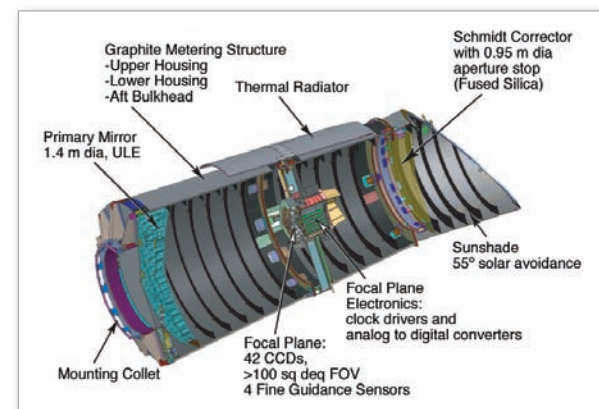
- the shapes of planetary orbits
- masses and densities of planets.

The *Kepler* Team

The *Kepler Mission* is a competitively-selected Discovery mission of NASA Ames Research Center with scientists from: Aarhus Universitet, Denmark, Ball Aerospace & Technologies Corp., Carnegie Institution of Washington,

Harvard University, Jet Propulsion Laboratory (JPL), Las Cumbres Observatory, Lawrence Hall of Science of UC Berkeley, Lowell Observatory, NASA Ames, NASA Goddard Space Flight Center, National Optical Astronomy Observatory, SETI Institute, Smithsonian Astrophysical Observatory, Space Telescope Science Institute, University of California, Berkeley, University of Hawaii, University of Texas at Austin, University of Washington, US Naval Observatory Flagstaff and York University, Canada.

JPL is managing the development of the project. Ball Aerospace is building the flight hardware and will manage its flight operation. NASA Ames is managing the ground system development and will manage the flight and analyze the data. The Laboratory for Atmospheric and Space Physics at the University of Colorado will perform the mission operations. The data will be archived at the Space Telescope Science Institute.



Photometer Cross Section

When?

Kepler launches in March 2009. The mission will last for three and one-half or more years to enable the detection of 3 to 4 transits for each planet in the habitable zone of a star.

Learn More?

On the *Kepler* web site, you will find computer animations, lessons, a paper model of the *Kepler* spacecraft, and more.

For more information visit <http://kepler.nasa.gov>